COMPARING CHEBYSHEV POLYNOMIALS AND ADOMIAN DECOMPOSITION METHOD IN SOLVING NONLINEAR VOLTERRA INTEGRAL EQUATIONS OF SECOND KIND

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Specially dedicated to my beloved parents,
Mohamad Sapawi bin Ramli and Zanariah bt Mahmud

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ABSTRACT

The nonlinear integral equations are usually difficult to solve analytically and in many cases, it is required to obtain the approximate solutions. The nonlinear Volterra integral equation of second kind is one of them. This dissertation compares two methods that are used in order to solve nonlinear Volterra integral equation of second kind. Those are Chebyshev polynomials and Adomian decomposition method. The Chebyshev polynomials are developed to approximate the solution of linear and nonlinear Volterra integral equations. While, Adomian decomposition method, is a method that can be applied directly for all type of linear and nonlinear integral equations and maintain high accuracy of numerical solution. Hence, the best method is picked based on the absolute error that will be compared with the exact solution.

ABSTRAK

Persamaan kamiran tidak linear kebiasaannya sukar diselesaikan secara analitik dan untuk menyelesaikannya memerlukan penyelesaian anggaran. Persamaan kamiran Volterra tidak linear merupakan salah satu darinya. Penyelidikan ini membandingkan dua kaedah untuk menyelesaikan Persamaan kamiran Volterra tidak linear iaitu kaedah polynomial Chebyshev dan kaedah penguraian Adomian. Kaedah polynomial Chebyshev dibentuk untuk menganggarkan penyelesaian persamaan kamiran Volterra linear dan tidak linear. Manakala, kaedah penguraian Adomian merupakan kaedah yang boleh digunakan secara langsung samaada pada persamaan kamiran tidak linear atau linear dengan mengekalkan ketepatan daripada penyelesaian berangka. Kaedah yang paling baik dipilih dari penyelidikan ini berdasarkan ralat mutlak apabila dibandingkan dengan penyelesaian tepat.